PART III

Physical Description

Physical Regions of Washington

On the basis of surface features, Washington may be divided into eight general regions. Agricultural settlement is influenced by factors of topography, climate, soil, forest vegetation and water resources distinctive to each of the physiographic regions. Each has become a different type of farming area as settlers have learned to adapt crops and livestock to the conditions, or have improved limitations through drainage or irrigation.

Coastal Plains

A narrow, sandy plain with shallow bays, tidal flats, stream deltas and low headlands lies between the coastline and the Coast Range. It extends from the Columbia River mouth almost to Cape Flattery, being widest and lowest in the Grays Harbor and Willapa Bay districts. The climate is mild and damp with a long growing season, but it is too cool, cloudy and wet for most crops. Originally this area was covered with heavy forests and much is now covered with woodlands. Lumbering and manufacture of wood products is the main industry. Farming is largely of the livestock and dairying type on low uplands and drained areas in the lower Chehalis River Valley. Cranberry growing is important and well-adapted to numerous, boggy areas in the Grays Harbor and Willapa Bay sections. The shallow bays are also used for oyster culture. Fishing is common in the rivers and coastal banks.

Coast Range

The Coast Range is an uplifted area of sedimentary and metamorphic rocks divided into the Olympic Mountains and the Willapa Hills. The Olympics tower to nearly 8,000 feet in a dome-like structure, carved deeply by rivers. These mountains have the heaviest precipitation in the state. Snowfields and heavy forest cover the mountains. Most of the wilderness area is within the Olympic National Forest and Olympic National Park, being managed for recreation, wildlife and timber. Farm settlement is limited to some foothill river plains and coastal terraces such as the Dungeness and Port Angeles districts along the Strait of Juan De Fuca. Here in the lee of the mountains, rainfall is moderate and irrigation is practiced by some livestock farmers. The Willapa Hills country is wet, heavily forested and carved into numerous narrow valleys. Logging is the main industry, combined with livestock farming in the upper Chehalis River Valley and along the banks of the Columbia River. Wet climate, hilly topography and the difficulty of clearing stump land retards agriculture.

Willamette-Puget Sound Lowland

A broad lowland, described as a trough or valley, lies between the Coast Range and the Cascade Mountains. The northern part is the Puget Sound Lowland which has been glaciated and occupied by the sea in the lowest section. The cintinental glacier reached slightly south of Olympia. Under a warming climate it melted and geologists believe it receded about 25,000 years ago, leaving an infertile plain of moraines and outwash gravels, sands and clays known today

as the Puget Glacial Drift Plain. Its rolling surface has numerous lakes and bogs. Most of the major cities--Seattle, Tacoma, Everett, Bellingham and Olympia--have been built on moraines bordering the Sound. Rivers, such as the Nooksack, Skagit, Snoqualmie, White and Puyallup, built up deltas and flood plains over the older gravelly plains. These narrow valleys are more fertile than the older glacial plains and support numerous small dairy, vegetable and berry farms. Most of the gravelly areas are wooded with a second-growth forest and are used for pastures. In the southern part of the Willamette-Puget Sound Lowland, there are two large valleys--the Cowlitz and Chehalis. They drain a low, hilly area with several flat prairies and bottom lands.

Agriculture is handicapped by poor drainage and flooding of the river deltas and plains, by heavy winter rainfall, by cloudy but dry summers, by coarse, gravelly upland soils and by densely wooded land which is costly to clear. Advantages are mild climate and a location close to major markets for farm products such as milk, poultry and vegetables.

Cascade Mountains

The Cascades are a wide and high topographic and climatic barrier which separates western and eastern Washington. The range is made up of sedimentary, igneous and metamorphic rocks which have been carved by glaciers and streams. High, isolated volcanic cones of lava such as Mt. Adams (12,307 feet), Mt. Rainier (14,408 feet) and Mt. Baker (10,791 feet) appear upon the older Cascade rocks. The Cascade crest varies between 3,000 and 10,000 feet and is higher and more rugged in northern Washington. Roads and railroads have been built across its lower passes in central and southern Washington. The Columbia River has cut a deep gorge and the lowest pass through the barrier. The western slope is wet and heavily forested with Douglas fir. The eastern slope is drier with a less-dense pine forest. Nearly all classified as forest land, most of the area is in Federal ownership in five national forests and Mount Rainier National Park. Tree fruit farming in the eastern slope valleys of Wenatchee, Chelan, Methow, Naches and the Columbia Gorge is most important. Sheep and cattle summer grazing on alpine grasslands is another use. Deep western slope valley bottoms such as the Skagit, Snoqualmie, Nisqually, Cowlitz and Lewis also contain livestock farms. The area is vitally important as a source of timber. Steep terrain, wet climate, short growing seasons and heavy forest vegetation are main handicaps for agriculture.

Columbia Basin

A low plateau of old lava rocks covered with stream and wind-deposited soils extends in a series of plains, ridges, coulees and hills from the Cascades to the eastern Washington border. The area is basin-like in structure, being higher around its margins and sloping inward to low and level central plains. It has been sharply eroded by the Columbia River and its interior tributaries, the Snake, Yakima, Palouse and Spokane Rivers. The basin has sub-areas created by crustal movements and erosion.

The Yakima Folds are a series of hilly ridges extending from the Cascades eastward into the lower part of the basin. The Yakima and Columbia Rivers have cut gaps through the ridges and built up plains in the troughs between them. The rich, alluvial plain of the Yakima River is an important irrigated valley.

The Waterville Plateau is a tableland of thin soils overlaying basaltic rock at an elevation of 2,500 to 3,000 feet. It has gorges cut by the Columbia River and ancient glacial outwash streams once flowing in Moses and Grand Coulees. It is too high for irrigation and is used for dryland grain and livestock farming. The high plain is often called the Big Bend country.

The Channelled Scablands is a belt of dry terrain carved by ice-age rivers into a series of coulees. Bare rock is exposed in the coulees. Small plateaus between the old river channels have thin soils used for dryland farming. The Grand Coulee of this region has been developed into a major irrigation reservoir.

The Palouse Hills consist of fertile deposits of wind-blown soil overlaying basaltic lava flows. After being deposited in large dunes, the formation was reshaped by streams into an intricate pattern of low, rounded hills which are tilled for wheat, barley and legumes. The hills receive 16 to 25 inches of rainfall and have deep, porous and fertile soils. It is one of the richest farming areas of the Pacific Northwest.

The Central Plains are low and relatively level expanses of soil, deposited by old streams crossing the Channelled Scablands and later by the flooding of the Yakima, Columbia, Snake and Walla Walla Rivers. Climate is desert-like (6-12 inches of precipitation per year). The lower lands of the area, the Quincy and Pasco Basins and the Walla Walla Valley, are irrigated. Quincy Basin is a new irrigation area watered by Grand Coulee Dam.

Agricultural handicaps in Columbia Basin regions are mainly found in its dry, continental climate. Large irrigation systems built since 1900 have overcome much of the need for water on rich valley and basin soils. Dryland farming in higher areas is practiced widely, although occasional variations in rainfall, lack of snowfall, winter-kill, water and wind erosion inflict damage to field crops and to livestock ranges.

Okanogan Highlands

A portion of the Rocky Mountains, consisting of well-eroded old granites, lavas and sedimentary rocks, extends across north central Washington. These are the Okanogan Highlands, the state's richest mineral area. Summit levels reach 4,000 to 5,000 feet with peaks exceeding 7,000 feet. Prominent north-south valleys are occupied by irrigated tree fruit and livestock farms. These are the Okanogan, Sanpoil, Kettle and Colville Valleys. The Columbia River gorge through the Okanogan Highlands is occupied by the large man-made lake behind Grand Coulee Dam--Roosevelt Lake. High and wetter portions are forested with pine and larch, and are managed for timber and for livestock ranges by the United States Forest Service and the Bureau of Indian Affairs. Cold winter temperatures, short growing seasons, dry valley climates and distance from markets are farming handicaps.

Selkirk Mountains

The Selkirks, a range of the Rocky Mountain system, extend into the northeast corner of Washington. The rocks are old mineralized granites and metamorphics reaching elevations of over 7,000 feet. The Pend Oreille River Valley

at the base of the Selkirks is an agricultural area of narrow bottom lands settled by livestock farmers. Nearly all of the uplands are in Kaniksu National Forest. While climate is cool and growing seasons are short, the Pend Oreille Valley has an advantage of being closely located to the Spokane metropolitan market area.

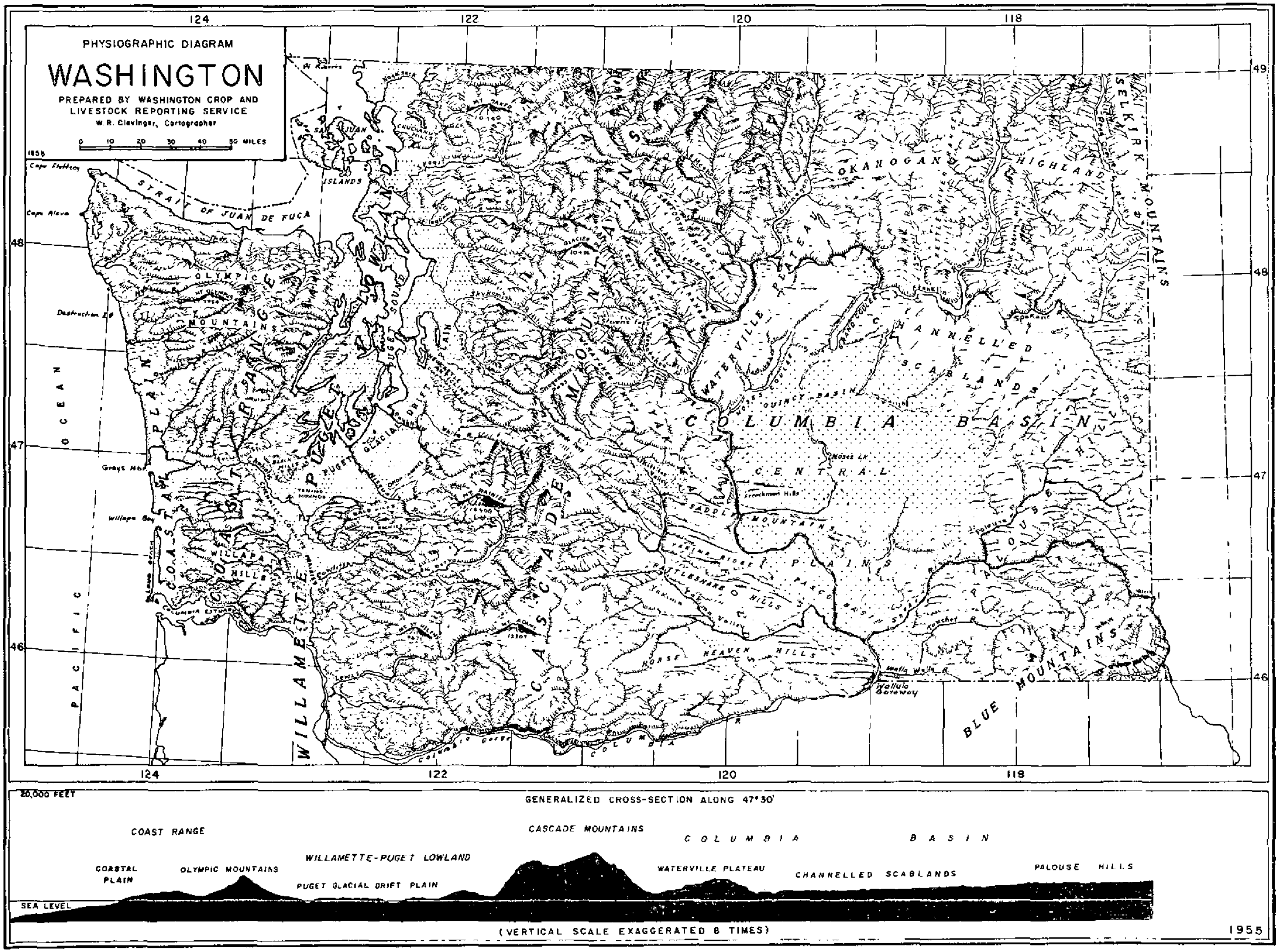
Blue Mountains

The Blue Mountains are an uplifted and eroded plateau extending into the southeastern corner of Washington. The strata are mainly ancient crystalline rocks which contain some minerals. The highest point of the mountains in the Washington section is Diamond Peak (6,401 feet), on the divide between the Grande Ronde, Tucannon and Touchet Rivers. These rivers, and the Walla Walla River, have cut valleys into the plateau. Extensive pine forest and grassland areas are in the highlands within Umatilla National Forest, where rainfall is 30 to 40 inches. The Snake River has cut a deep valley and gorge across the lower parts of the mountains. The area is well developed agriculturally around its northern foothills where wind-blown soils are deep and irrigation systems are used. The Walla Walla and Tucannon Valleys are rich grain, legume and livestock areas grown under irrigation and by dry farming. Grazing is an important use of the high lands by livestock ranchers in the upper valleys.

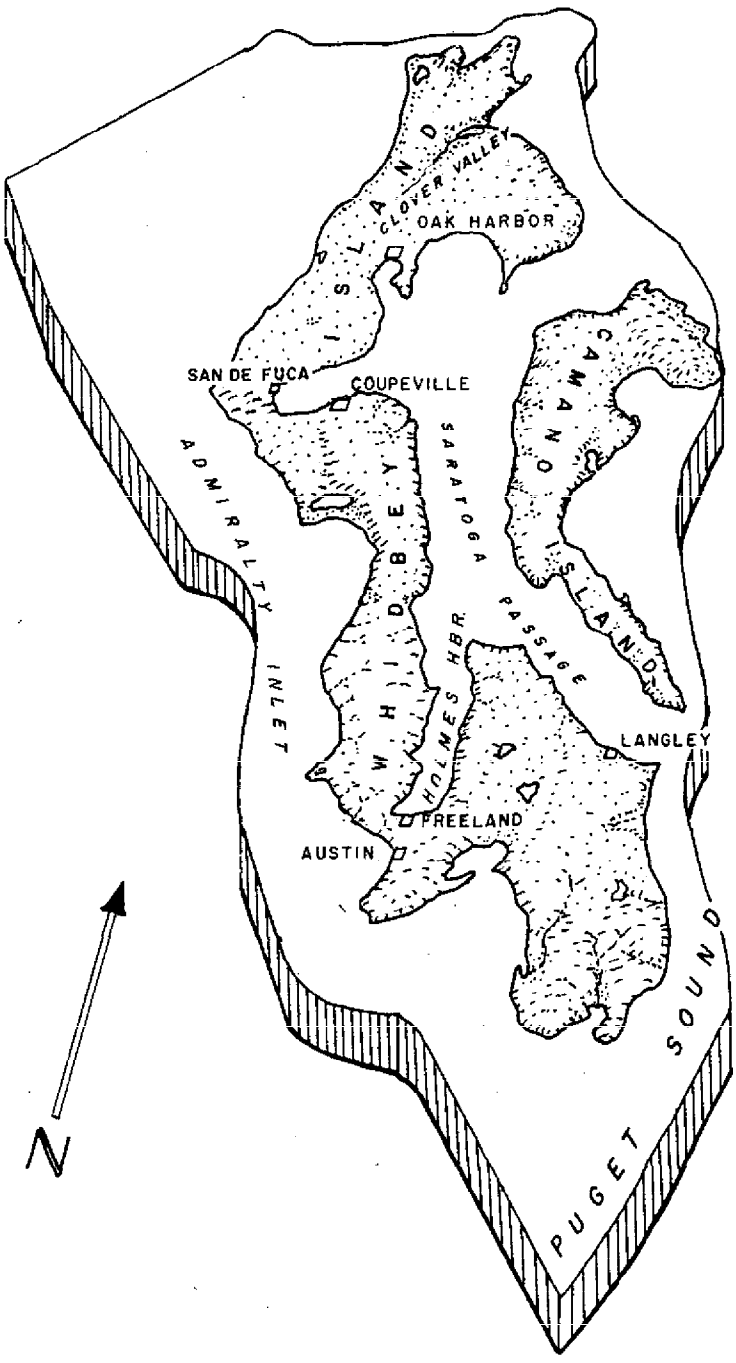
Topography of Island County

In contrast to other western Washington counties, the terrain of Island County is a low and rolling and slightly hilly countryside, nowhere exceeding 600 feet above sea level. Essentially, the county consists of two low elevated island plateaus of glacial deposits on underlying rocks which are slightly raised above the shallow floor of northern Puget Sound. Whidbey Island (official spelling by Board of Geographic names) is the largest of the two major islands in the county, being about 38 miles long and averaging 5 miles in width. It has an area of about 180 square miles, or 115,000 acres of land, being the largest island of Washington and one of the larger islands in the United States. Camano Island is the other major topographic feature. It is about 15 miles long and 11 miles in width, having an area of about 47 square miles or 30,000 acres. Two quite small islets, Ben Ure in Deception Pass and Hockney in Holmes Harbor, complete the island group. The county's landscape is an attractive and varied pattern of cultivated prairies, rolling woodlands, glacial lakes, beaches, lagoons and sheltered harbors, bays and coves.

The early English explorers mistakenly believed that the two islands were part of the mainland. Camano Island is virtually attached to the mainland at the delta of the Stillaguamish River. As the delta advanced westward filling in the shallow strait of West Pass of Skagit Bay, a narrow passage, Davis Slough, was kept open by the rapid tidal currents between Camano Island and Snohomish County. Davis Slough was estily bridged to connect Camano Island to the mainland. Whidbey Island in the deeper Puget Sound waters was only separated from Fidalgo Island and the Skagit County mainland by the narrow and deep Deception Pass. Strong tidal currents sweeping in and out of Skagit Bay made this passage treacherous. It was a varrier isolating north Whidbey Island until it was bridged in 1935. The narrow passes thus were topographic features which enabled man to bridge them and overcome the transportation handicaps which continue to keep many other Puget Sound islands dependent on ferries and barges for marketing farm products.


PHYSIOGRAPHIC DIAGRAM
WASHINGTON
PREPARED BY WASHINGTON CROP AND LIVESTOCK REPORTING SERVICE
W. R. Clevinger, Cartographer
0 10 20 30 40 50 MILES
STRAIT OF JUAN DE FUCA
SAN JUAN ISLANDS
OLYMPIC MOUNTAINS
COASTAL PLAIN
COAST RANGE
WILLAPA HILLS
PUGET LOWLAND
PUGET SOUND
WILLAMETTE
CASCADE MOUNTAINS
OKANOGAN HIGHLANDS
SELKIRK MOUNTAINS
WATERVILLE PLATEAU
CHANNELLED SCABLANDS
COLUMBIA BASIN
CENTRAL PLAINS
QUINCY BASIN
SADDLE MOUNTAINS
RATTLESNAKE HILLS
HORSE HEAVEN HILLS
PASCO BASIN
PALOUSE HILLS
BLUE MOUNTAINS
Wallula Gateway
OCEAN
PACIFIC
GENERALIZED CROSS-SECTION ALONG 47°30'
20,000 FEET
SEA LEVEL
COASTAL PLAIN
COAST RANGE
OLYMPIC MOUNTAINS
WILLAMETTE-PUGET LOWLAND
PUGET GLACIAL DRIFT PLAIN
CASCADE MOUNTAINS
COLUMBIA BASIN
WATERVILLE PLATEAU
CHANNELLED SCABLANDS
PALOUSE HILLS
(VERTICAL SCALE EXAGGERATED 8 TIMES)
1955

ISLAND COUNTY



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The terrain features which attracted early farming settlers and which are today harvested for crops are the flat and rolling prairie lands of central and northern Whidbey Island. These include Smith's Prairie and Ebey's Prairie south of Penn Cove and Coupeville. These lands originally were partially grasslands and are level and only 100 to 200 feet above sea level. A line of bluffs separate them from the Sound. The northern third of the Island from Penn Cove to Deception Pass is the primary farmland area. Gently rolling terrain with some marshlands extends over nearly 20,000 acres. The area is called Clover Valley and sometimes Oak Harbor Prairie. A large naval air station is located on its western edge.

Southern Whidbey Island and most of Camano Island are low plateaus of well-rounded hills with a few small creek valleys, lake beds and beach plains. The highest point in the county is a hill 576 feet high near Strawberry Point and east of Oak Harbor. Terrain creates some local problems of drainage, and in other places, water tables are low requiring deep wells. Because of the narrow breadth of the islands all streams are small and many are dry during the summer. Ground water and lakes are the main sources of water supply for domestic use and sprinkler irrigation. Limited water supply is a problem in many places.

The entire area is part of the Puget Glacial Drift Plain. It is believed that the good soils and flat terrain of northern Whidbey Island was formerly a lake bottom silted with glacial streams and finely sorted out-wash. The results of the thick ice sheet which once covered the islands is apparent in the low, well-rounded hills, the numerous lakes and ponds and the gravelly soils of southern Whidbey Island and Camano Island.

Land Classification and Soils

Island County land is broadly divided into four classes. A greater part of the county area is capable of being cultivated or managed as pasture land because of its moderate terrain, low elevation and deposits of sandy or gravelly glacial soils.

Class I and II land consisting of level prairies with silty and sandy loam soils are localized to districts near Oak Harbor, Coupeville and Freeland on Whidbey Island and Utsaladdy on northern Camano Island. The best soils of the county are the Bellingham and Ebeys loams in Clover Creek Valley near Oak Harbor and on Smith and Ebey Prairies south of Coupeville. The soils are deep and fertile and produce good crops of grain, hay, vegetables and berries. 1/ Because of light rainfall these soils are not deficient in soluble minerals.

Class III and IV land makes up the larger part of southern Whidbey Island and most of Camano Island. Soils of more coarse gravels--the Everett and Clallam loams derived from glacial deposits are predominant. Terrain is more sloping and hilly and the top soils become quite dry during the summer season. Most of Class IV land is in woodland and woodland pasture or is used for summer homes and other rural properties where little agriculture is practiced.

1/ U.S. Bureau of Soils. Reconnaissance Soil Survey of the Western Part of the Puget Sound Basin, Washington, Govt. Printing Office, Wash. D.C., 1912.

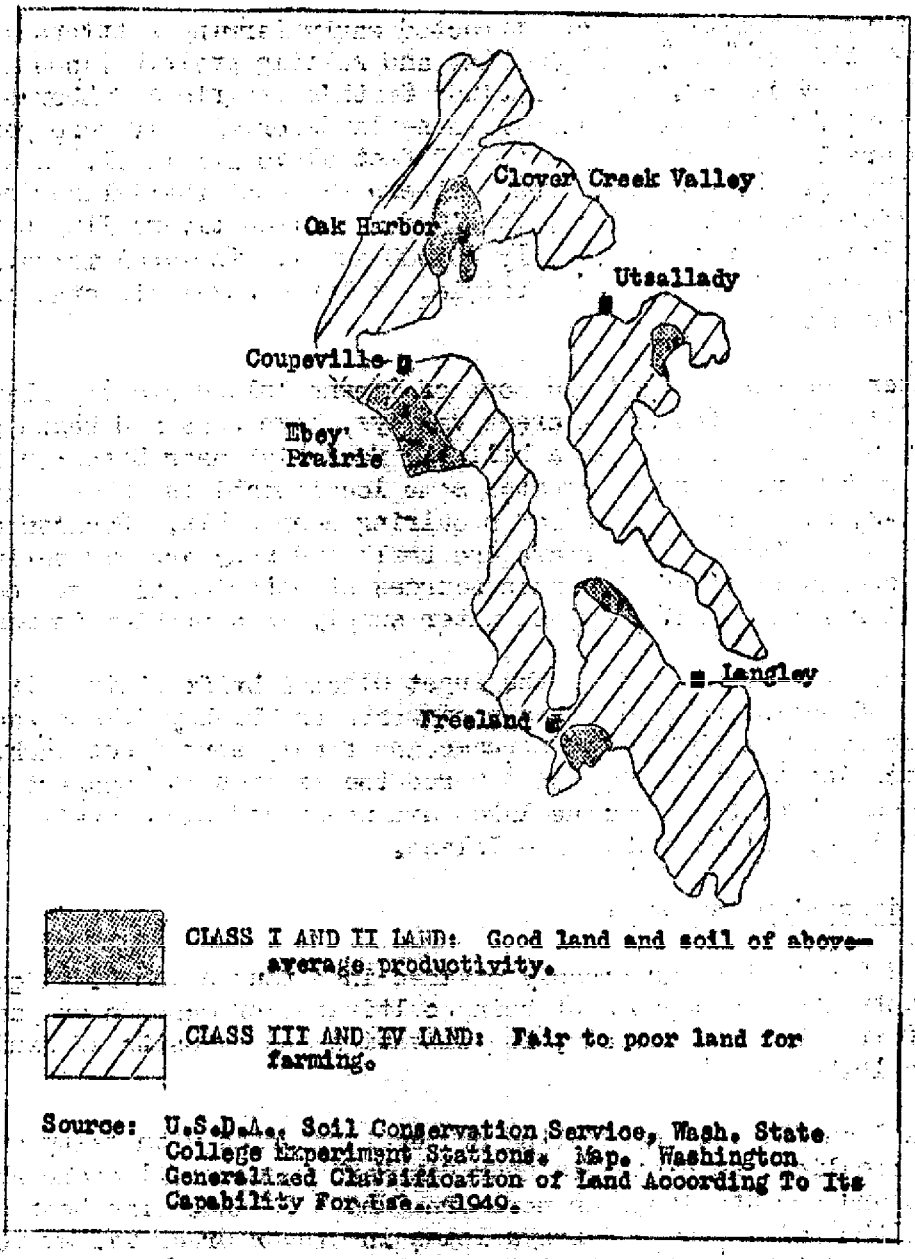

Figure 6.- General Quality of Land in Island County

Climate

Island is located in the West Coast Marine Climatic region of North America. It extends along the coast from southeastern Alaska to northern California. Climatologists and geographers describe this climate as one which is influenced by the mild, moist air flowing in from the ocean. The prevailing west winds of ocean air rising over the Olympic and Cascade Mountains bring cool, cloudy and wet conditions for about nine months of the year. During the summer, the land is warm and the winds from off the ocean are heated and do not drop moisture as frequently as in winter. Thus, there is generally a dry period during July and August with considerable sunshine to mature crops and provide good harvesting conditions for hay and grain.

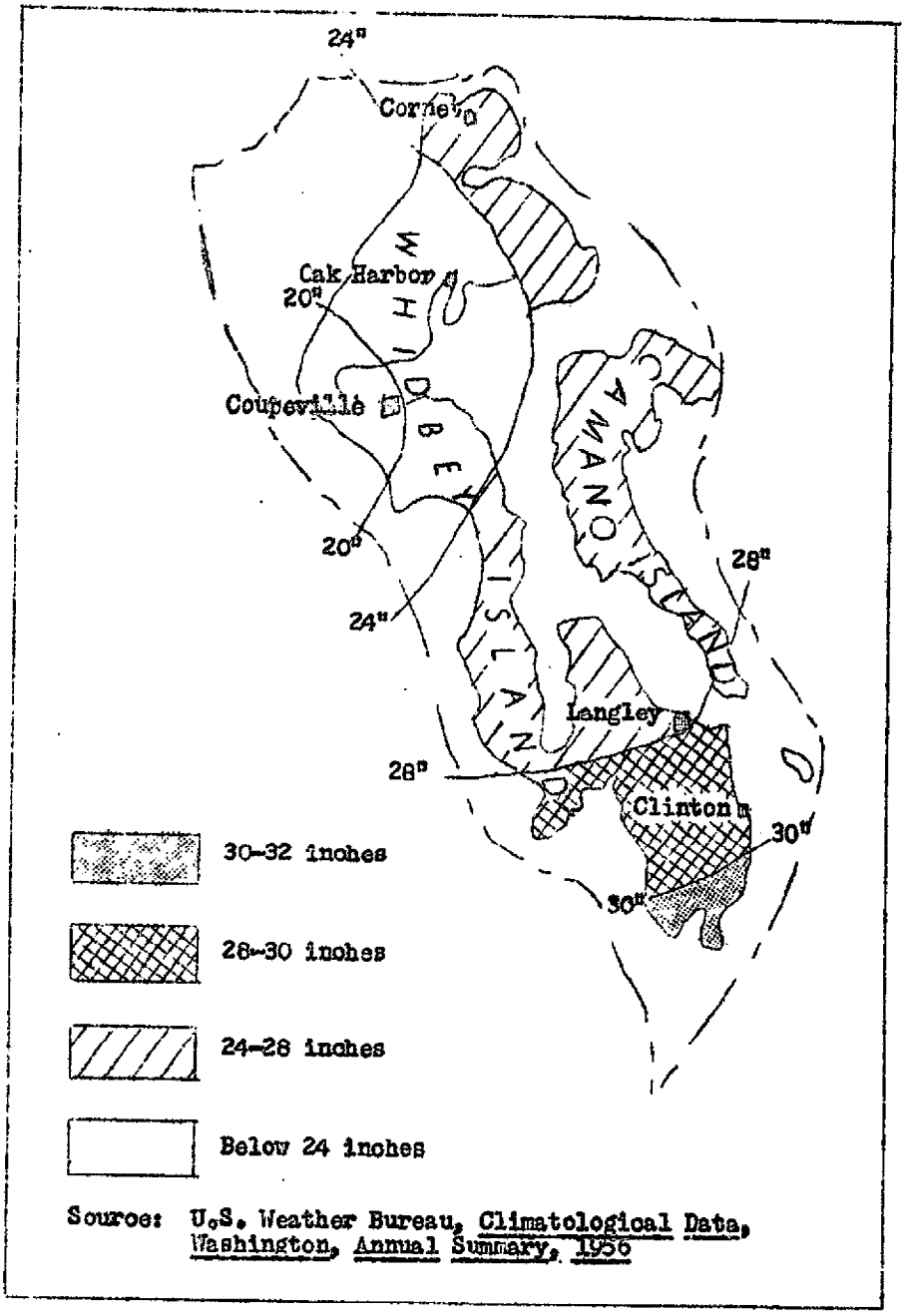

Figure 7.- Distribution of Precipitation, Island County

The climate is similar to other parts of the world located on the west margins of continents in the belt of the prevailing westerly winds. These include England, northwestern France, Holland, Denmark and Norway in Europe. In the southern hemisphere the same mild, cloudy and wet climate is found in southern Chile of South America and in southern New Zealand. In world regional and commercial geography, the countries located in the West Coast Marine climatic regions are noted for heavy forests which yield lumber and pulp. They are also important for dairy livestock farming.

Island County is warmer, sunnier and drier in comparison with other western Washington counties. This favorable climate results from low island terrain and a position in Puget Sound in the lee or rain shadow of the Olympic Mountains. It also enjoys some moderating influence from the marine water bodies which surround it.

Precipitation for an average year is comparatively light ranging from about 28 inches at Langley to 18 inches and less at Coupeville, Oak Harbor and other localities in the northern part. The southern parts of the county are cloudier and rainier than the north because of low hills and exposure to moisture laden southerly winds that sweep into the Puget Sound Lowland from Grays Harbor and the Chehalis River gap in the Coast Range. Southwesterlies that pass over the northern section at Coupeville, Oak Harbor and Utsaladdy are warming and drying winds which have passed over and descended the Olympic Mountains. In summer a cool northwest wind prevails blowing over the waters of Juan de Fuca and Georgia Straits. These winds are warmed as they pass over land and bring dry conditions.

Precipitation records at Coupeville (elevation 50 feet) show a long, cloudy and rainy season and a short, dry season. The wet season extends from October 1st to April 1st, with November, December and January being the rainiest months. Winter snowfall is generally light because of the low elevation. May, June, July, August and September comprise the dry season. August is driest, having an average of about three-quarters of an inch precipitation. Summer dryness is good for hay harvesting but lack of showers require use of sprinkler irrigation for good yields of field crops.

Table 6.- Precipitation By Months, Island County

Station and Elevation in Feet	Average Monthly Precipitation (in inches)												Annual Total (inches)
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
Coupeville (50)	1.94	1.54	1.62	1.15	1.29	1.36	.74	.68	1.19	1.64	2.16	2.29	17.60

Source: U.S. Weather Bureau, Climatological Data, Washington, Annual Summary, 1956.

Temperatures are warmer during the winters and slightly cooler in the summers than are generally found in western Washington. At Coupeville the average coolest period in January is about 38 degrees and summer temperatures are cool, averaging about 61 degrees during 24 hour periods in July and August. The tempering influence of Puget Sound waters prevents extremes of temperature. The warmest temperature on record at Coupeville is 96 degrees while the coldest reading is 5 degrees.

The island area enjoys a long growing season and a minimum of frosts and freezing periods. Records for a 40-year period show that the last killing frost of spring is generally about April 7 and the first in fall about November 1. This provides a growing season of 205 days generally free of frost or killing temperatures. The mild climate permits a long grazing period for livestock.

Table 7.- Temperature Extremes, Dates of Killing Frost
Island County

Station and Elevation in Feet	Temperature Extremes Recorded (degrees Fahrenheit)		Killing Frost Average Dates	
	Coldest	Hottest	Last in Spring	First in Fall
Coupeville (50)	5	96	April 7	November 1

Source: U. S. Weather Bureau

Table 8.- Temperatures For Selected Stations, By Months
Island County

Station and Elevation in Feet	Average Temperatures (in degrees Fahrenheit)												Annual Average
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
Coupeville (50)	38.2	40.4	42.7	48.5	53.1	57.2	60.4	60.7	56.8	50.3	43.9	40.7	49.5

Source: U. S. Weather Bureau

Forests, Woodlands, Land Ownership, Recreational Resources

Most of Island County is in forested land. About 70 percent or 92,340 acres is in farm, private and publicly-owned woodlands. In 1954 there were 16,500 acres of woodland and 3,960 acres of pastured woodlands belonging to farmers. The original forests of Whidbey and Camano Islands were logged prior to 1920 and today most of the timber is regrowth Douglas fir, western hemlock, red cedar, alder and maple which is large enough for sawmilling and for poles and piling. Douglas fir is the dominant species. Numerous farmers are now harvesting saw logs, poles, pulpwood, firewood, Christmas trees and other minor forest products from the wooded areas. Southern Whidbey Island and Camano Island are mainly in private woodlands owned by farmers, timber and land holding corporations and individuals.

Both forest and non-forest land is predominantly in private ownership. Federal land, primarily in Whidbey Naval Air Station amounts to 6,380 acres. State ownership in park, school and university lands consists of 15,500 acres. Private lands are approximately 110,000 acres with 51,445 acres in farms and 58,555 acres in industrial, corporate and private tree farms and timberlands. In 1954 private forest lands and public forest lands yielded a log cut of 16,930,000 board feet of sawlogs for local and Puget Sound lumber and paper mills.

The forested land of Island County is an important recreational resource combined with the use of its Puget Sound beach and boating resorts. There are two state parks--Deception Pass and Camano Island--and numerous private resorts and summer homes on the two islands.

Washington State Game Department reports show that the forested and farmland areas are used well for hunting and fishing. Whidbey Island is noted for rabbit, pheasant and deer hunting. Several thousand rebbits and over 6,000

pheasants and 900 deer are bagged per hunting season by sportsmen. Four lakes--Cranberry, Deer, Goss and Lone--are well stocked and popular for trout and bass fishing. Off-shore salt water salmon fishing, crab fishing and shell fish digging are also popular recreational activities in the maritime waters of Island County. Rural trappers and farmers also harvest a winter fur catch of about 300 muskrat, 150 wild mink and 100 raccoon from lakes and streams.